SECTION 16140
WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawing and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY

A. This section includes the following:
   1. Wall switches.
   2. Receptacles.
   3. Device plates.
   4. Surface metal raceway.

B. Related Sections: The following sections contain requirements that relate to this section:
   1. Section 16131, Boxes.
   2. Section 16196, Electrical Identification.

1.3 REFERENCES

A. National fire Protection Association (NFPA)
   1. NFPA 70-99, National Electrical Code.

B. National Electrical Manufacturer's Association (NEMA)
   NEMA WD 1-83, General Purpose wiring Devices.
   NEMA WD 6-88, Wiring Device Configurations.

C. Underwriters Laboratories, Inc. (UL)
   UL 498, 1995, Electrical Attachment Plugs and Receptacles
   UL 943, 1993, Ground Fault Circuit Interrupters

1.4 SUBMITTALS

A. Products furnished from listed manufacturers are pre-approved but still require submittal.

B. Submit proposed substitutions for approval in accordance with General and Supplementary Conditions.

C. Submit drawings for approval showing the complete layout of all products that make up the complete system for each floor prior to installation with raceway lengths, device type (power and data), locations and circuits identified.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Furnish products UL listed and classified as suitable for purpose specified.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver components in factory furnished boxes, crating and covering.

B. Store and handle components to prevent damage.

1.7 SEQUENCING AND SCHEDULING

A. Locate and secure components as shown. Install devices in the construction sequence so as to prevent damage to installed equipment.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Arrow-Hart, Bryant, General Electric, Hubbell, Leviton, Pass & Seymour, Wiremold and Slater.

2.2 WALL SWITCHES

A. Wall Switches: NEMA WD 1; Specification-Grade, "1221" series, ivory finish, flush-tumbler type with operating mechanism totally enclosed in a molded urea or nylon composition case rated at 20 A at 125 V unless otherwise noted.

B. Provide "ac only" switches for alternating current circuits.

C. Provide "ac-dc T" switches for direct current circuits.

2.3 GENERAL PURPOSE RECEPTACLES

A. Receptacles: NEMA WD 1 and NEMA WD 6; Specification Grade, "5362" series, white finish, double wipe contacts, side/back wired, with nylon back and face, rated at 20 A at 125 V unless otherwise noted.

B. GFCI Receptacles: NEMA WD6, UL 498, and UL 943: Specification grade, configuration 5-20R, Duplex type, white, matching general receptacles, rated 20A at 125 V, unless otherwise noted.

C. Enclosures: As indicated.

D. Mounting: Surface, recessed or floor, as indicated.

2.4 WELDING OUTLETS:

A. Hubbell, twist lock type, model #26410, 600 volt, 3 phase plus ground, 60 ampere, in box #26401 with 45 degree angled housing #26404, or equal. Only equals that exactly match the form, fit, function and electrical ratings shall be acceptable, any such equals for this item shall be submitted for approval with construction bid.

B. Provide caution signs for 480-V receptacles.

2.5 POWER OUTLETS:

A. 208 volt, 30 Ampere, 3 phase, 4 wire with ground NEMA L21-30R rated outlet.

B. Provide one cap per receptacle to the Contract Manager in original factory packaging.

2.6 SURFACE METAL RACEWAY

A. Materials

1. The raceway and all system components must be UL Listed. Steel shall be galvanized. Finish shall be gray and be suitable for field repainting to match surroundings.
   a. Raceway
      1) The raceway shall be a two piece design with a metal base and a snap-on metal cover. The base shall be a minimum of 0.050" wall thickness and the cover a minimum of 0.040" wall thickness. Assembled base and cover shall be 4.75" wide by 3.56" high with a cross sectional area of 15.82 square inches. The base shall be dividable into two equal compartments; or two compartments representing a 1/3 and 2/3 split; or three equal compartments by means of a removable barrier.
      2) A hand operated cutting tool shall be available for the cover to ensure clean, square cuts.
   b. Fittings
      1) A full compliment of fittings must be available including but not limited to flat, internal and external elbows, entrance fittings, wire clips, cover clips, couplings, c-hangers and end caps. The fittings shall be colored to match the raceway. All fittings shall be supplied with a base where applicable to eliminate mitering.
   c. Device Brackets and Plates
      1) Device brackets shall be available for mounting standard single or two gang devices both horizontal or vertical within the raceway. Devices, both power and data/communication shall have the capacity of mounting flush or in conjunction with standard faceplates. Circuit breaker housings shall be available to mount from one to three single pole circuit breakers within the raceway.
   d. Plastic Overlapping Cover Bracket and Face Plates
      1) A plastic device mounting bracket and trim plate shall be available to install devices horizontally. Trim plate shall overlap cover eliminating seam. Face plates shall be available to accept a variety of power and data/communication devices. Plastic material must exhibit nonflammable self-extinguishing characteristics, tested to comparable specifications of UL94V-0.

2.7 COVER PLATES

A. Finished, flush mounted locations: White Nylon

B. Other Locations: Brushed, stainless steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify outlet boxes are installed at proper height.

B. Verify wall openings are neatly cut and will be completely covered by wall plates.

C. Verify floor boxes are adjusted properly to finished floor.

D. Verify branch circuit wiring installation is complete, tested, and ready for connection to wiring devices.

E. Verify openings in access floor are at proper locations.

3.2 PREPARATION

A. Clean debris from outlet boxes.

3.3 INSTALLATION

A. Install wall devices and plates after walls in area are finished.

B. Install extension rings on outlet boxes to extend flush with finished surface.

C. Install products according to manufacturer's instructions.

D. Install devices plumb and level.

E. Install switches with OFF position down.

F. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.

G. Connect three-phase, four-wire power receptacles so that the A-B-C-phase sequence of the circuit is counterclockwise or in accordance with NEMA configuration.

H. Surface metal raceway:
1. Prior to and during installation, refer to system layout drawing containing all elements of the system. Installer shall comply with detailed manufacturer's instruction sheets which accompany system components as well as system instruction sheets, whichever is applicable.
   a. Mechanical Security
      1) All raceway systems shall be mechanically continuous and connected to all electrical outlets, boxes, device mounting brackets, and cabinets in accordance with manufacturer's installation instruction sheets.
   b. Electrical Security
      1) All metal raceway shall be electrically continuous and bonded in accordance with the National Electric Code for proper grounding.
   c. Raceway Support
      1) Raceway shall be securely supported at intervals not exceeding 10 feet or in accordance with manufacturer's installation sheets.
   d. Completeness
      1) All raceway systems shall be installed complete, including insulating bushings and inserts where required by manufacturer's installation sheets. All unused raceway openings shall be closed.

3.4 FIELD QUALITY CONTROL

A. Check each wiring device for defects.

B. Verify each wall switch circuit is energized.

C. Verify proper operation of each wall switch.

D. Verify each receptacle device is energized with correct wiring connections.

E. Randomly check 120-V receptacles for proper neutral and ground wire connections.

a. After installation, check for correct wiring by use of a Daniel Woodhead Model 1750 tester.
b. After completion of wiring check, perform an "Equipment Ground Impedance Test" using an Ideal Industries Model 61-152, "Ground Loop Impedance Tester." Maximum allowable impedance: 1.0 ohms. **Caution**: Test each receptacle with no loads plugged into other receptacles sharing the same equipment ground conductor.
c. Check each receptacle for contact tension using a Daniel Woodhead Model 1760, "Receptacle Tension Tester." Minimum tension for current-carrying contacts: 20 oz. Minimum tension for grounding contact: 10 oz.
d. Replace receptacles not satisfying requirements.

F. 208-V and 240-V Receptacles:
a. Check receptacles for proper wiring with voltage tester, such as "Ideal" No. 61-055.
b. After completion of wiring check, perform an "Equipment Ground Impedance Test" using an ideal industries model 61-152, "Ground Loop Impedance Tester," modified for l88 V through 260 V. Maximum allowable impedance: 1.0 ohm. **Caution**: Test each receptacle with no loads plugged into other receptacles sharing the same equipment ground conductor.
c. Replace receptacles not satisfying requirements.

G. Power Receptacles
a. Check phase sequence by using a phase-indicating meter, such as Electro Mechanical Company, Inc., Oakland, CA, Cat. No. 4600. Check phase-indication meter against CM's standard meter.
b. Correct wiring for receptacles found incorrectly wired.

3.5 ADJUSTING

A. Adjust devices and wall plates flush and level.

3.6 PROTECTION

A. Protect finished device installation from damage from continuing construction activities.

END OF SECTION 16140